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CONTENTS

Original Papers

Greater Efficiency Through Better Vision in Industry. Roy S. Dean 150
Campimetry. Leslie W. Myers..... 157

Notes, Cases and Instruments

Optometric Order of Study. Fay McFadden..... 158
A Six Foot Working Distance in Retinoscopy. Walter B. Lyon.... 159
Astigmatic-Anisometropia. Louis L. DeMars..... 159

Editorials

Professionalism Versus Commercialism..... 160
A New Test Chart..... 161
Our Societies 161

Reports and Announcements of Societies

North Dakota Optometric Association Convention..... 162
The Nebraska Method of School Penetration..... 162
The Nebraska Convention..... 163
John J. Palmer 163
Minnesota State Association Bulletin..... 164
Nebraska Men on Staff..... 164

"ON TO FARGO"

Annual Convention of the

NORTH DAKOTA OPTOMETRIC ASSOCIATION

August 12th and 13th

NORTHWEST JOURNAL OF OPTOMETRY
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GREATER EFFICIENCY THROUGH BETTER VISION IN INDUSTRY

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To properly discuss the question of "Greater Efficiency Through Better Vision" in industrial and school work, we must, of necessity, take into consideration all of the contributing factors, namely: Pathology, Malnutrition, Illumination—both artificial and natural, Safety, Compensation Insurance, and lastly, Vision itself, since it is through the removal of the contributing causes that we produce greater efficiency.

Pathology

Pathology enters into only a small per cent of the cases in our work, as a majority of the industrial employees seek medical attention, and the school children are being cared for through the medical department of the school.

Mal-nutrition

Mal-nutrition, however, is an important factor, in view of the fact that a large per cent of the industrial employees, due to the lack of time during the day, take their recreation at night, thus robbing them of their sleep. They, therefore, arise late, eat a hurried breakfast or none at all, in order not to be late for work, with the result that they eat piece-meal, while trying to attend to their duties. This lack of food, or if eaten hurriedly, tends to lower their resistance as well as to slow up production, and can be overcome only through an educational campaign, explaining the effects on their general health.

Illumination—Artificial, Fundamentals

According to the Society for Electric Development, in the last year of the war and in the year immediately following, more progress was made in the application of artificial lighting than in any ten-year period preceding. Continual improvements in lamps and reflecting equipments, the constantly increasing availability of electric service, and the growing knowledge of illumination fundamentals, had, over a period of years, been paving the way for a sudden, sharp advance in lighting practice.

In no field of lighting was the progress so remarkable as in industry, for here the value of good illumination could be more easily measured in terms of dollars and cents. Tests conducted under the actual working conditions demonstrated that starling increases in production were possible when antiquated lighting systems were replaced with new ones which produces lighting comparable with the day-light lighting, of well designed modern factories. Most executives believed in good lighting, they acknowledged its importance, but what they did not know, and what had not been satisfactorily demonstrated, was that, what were then considered good lighting installations were not supplying enough light; in other words, were not good lighting. Once the traditional illumination levels were broken through and levels 3, 4, and 5 times as high tried out in service, the handicap imposed by previous standards became apparent. Artificial lighting in every field moved forward.

Amount of Light

We do not know today how much light is right for many applications. We do know that 3 or 4 foot-candles will enable one to see more detail than will 1 foot-candle; that 10 foot-candles will reveal more than 3 or 4; that 50 foot-candles will increase perception over 10; That 100, or even more, will sometimes produce still further improvements when the eyes are taxed to the utmost. We know that vision is quickened when the illumination is increased from 2 or 3 foot-candles to 10, 50, or 100 or more. We know that persons with defective vision, and this means a surprisingly large porportion of the people, are even more greatly handicapped by poor lighting than those with good vision, and that they

respond more markedly to improvements in the lighting. Again we know that bright and cheerful surroundings are stimulating, that they inspire cleanliness, that they make for order and neatness. In these simple fundamental facts we find the reasons why, in industry, higher levels of illumination increase production without imposing strain upon the employees, why they automatically reduce accident hazard, decrease spoilage, and improve morale; why, in the office, they enable work to be performed with fewer headaches, less mistakes, and better tempers; why, in the store, they attract customers, facilitate the examination of material, and make for quicker sales; and why, in the home, they facilitate reading, working or studying at night.

Diffusing of Light

With the 10 to 1 increase in efficiency of the incandescent lamp, since its invention scarcely two-score years ago, has come the generation of large volumes of light in a small space. This means, of course, light sources of great brilliancy. A bright source does not in itself insure adequate lighting, in fact, unless skillfully handled it presents a positive menace to vision. Objects are seen by light which comes to them from the eye; light which comes directly from the light source to the eye or is reflected from the source to the eye by some polished surface is not only useless in illuminating the object viewed, but if of high intensity or of large volume, it produces a blinding effect which seriously interferes with seeing and may result in permanent injury to the eyes. "Glare" is the term applied to light which obstructs vision in this way.

Glare blinds the driver of an automobile when approaching another with improperly adjusted headlights at night; it handicaps the workman who is trying to see fine details with a brilliant light source near his line of vision; it produces acute discomfort in the conference room where men sit facing inadequately shaded windows for a long period of time; it is annoying in the home where wall brackets containing unshielded lamps are seen against dark backgrounds; it blinds the ball player, who tries to follow the ball against the sun. In hundreds of ways it is constantly interfering with vision and handicapping us in work and play.

Specular reflection, that is, the reflections of light sources in polished surfaces, while sometimes an aid to vision, is often, because of its insidious nature, more harmful than direct glare. Under proper control, it facilitates the reading of the micrometer scale or the inspection of a polished surface; in excess, it becomes reflected glare, dulls perception, and paves the way for accident. As moderate specular reflection, it brings out the texture of materials and assists the housewife in her sewing; as reflected glare, it blurs the printed page and causes eyestrain in reading. In small amounts, coming from the pavement to the eye it discloses the inequalities of the road to the motorist at night or reveals the pedestrian in silhouette, in large amounts, as from snow in sunlight, it produces painful and serious injury to the eyes.

Fortunately, once the danger in direct glare and the advantages and disadvantages in specular reflection are understood, the means for eliminating the bad and retaining the good is readily available. The answer lies in proper diffusion of the light. The reflecting equipments now regularly manufactured provide any degree of diffusion considered desirable. The totally indirect type which directs all of the light to the ceiling, whence it is diffused throughout the room, represents the utmost in diffusion, the semi-indirect type, which directs a large proportion of the light to the ceiling, but transmits some through the bowl, provides a degree of diffusion which is preferred by many; so-called light-directing semi-enclosing, or totally enclosing, units are available in designs which provide good control of the light and satisfactory diffusion; enclosing globes of the proper size and density provide a diffusion of the light but afford little control of its distribution. Open reflectors of proper design eliminate glare from the lamp filament but afford no protection against reflected glare in polished surfaces. Such reflectors, however, when designed for and used with, bowl-enameled lamps constitute an equipment which is almost ideal for the majority of industrial applications. They are inexpensive, easy to maintain, allow con-

siderable control of the light distribution, provide good diffusion, and eliminate objectionable specular reflection while at the same time producing sufficient glint for the reading of a scale or the examination of textiles.

Color, Quality of Illumination

Since an object is seen by the light which comes to it from the source and thence by reflection to the eye, it follows that color in the object is seen only when the light retains rays of that color. For example, a red object will appear black under a light in which red rays are lacking or a blue object will appear black when blue rays are absent from the source. Daylight is composed of all the colors in proportions seen in the rainbow. The light from Mazda lamps contains all the colors composing daylight but if the spectra, or rainbows, of the two were to be compared it would be seen that the Mazda lamp was richer than daylight in the orange-red region and weaker in the blue. For ordinary purposes, the light from clear Mazda lamps is sufficiently like daylight to answer all requirements, but where color discrimination is a factor, as in sorting or grading processes for example, and in laundry where the scorch marks must be readily distinguishable, or where the artificial light is used to supplement daylight, as in an office, daylight lamps, which screen out the majority of the excess orange-red rays, find wide application.

For purposes of color matching, dyeing, process printing, and the like, where extreme accuracy is necessary in the observation of colors, a still further correction of the light is necessary. For this service so-called color-matching units, which provide a light of true and unvarying north-sky quality, are available.

The high efficiency of present incandescent lamps which makes practicable the approximation, or the duplication of daylight on a large scale also permits the modification of light to any desired extent for obtaining striking and unusual effects in display windows, in decorative lighting, and in the home.

Equipments designed especially for the control of color are readily available.

Shadow

Contrary, perhaps, to popular opinion, a certain amount of shadow is desirable for artificial lighting. Objects illuminated by perfectly diffused light appear flat and uninteresting, contours are lost, and it is difficult for the eye to form a correct judgment of the shape of the object. On the other hand, deep, black shadows are troublesome and are a source of constant danger because of what they may conceal. Shadows having a sharp edge or a series of sharp edges, which result from several small light sources near one another, are particularly annoying in office work, where they dance about the pencil point most disconcertingly. In general, in interior, lighting, only soft illuminated shadows with gradually fading outlines should be tolerated.

The number of shadows cast by an object and their length depends upon the number and the position of sources directing light toward the object; the softness of the shadow depends upon the area of the surfaces from which the light comes and upon the number of directions from which the light is received. Indirect and dense semi-indirect units which make the ceiling serve as the principal light source, and large units of the direct-lighting type, therefore, make for soft shadows, small units of the direct type make for sharp shadows. As a general rule, lighting units which are satisfactory for the application from the standpoints of light diffusion and low brightness will also prove satisfactory from the standpoint of shadow when a sufficient number are used to provide a satisfactory degree of uniformity in the lighting of the work.

Uniformity of Illumination

Where the prime purpose of lighting is the production of artistic effects, uniformity of illumination may be desirable. On the other hand, it is not an uncommon experience to find in industrial plants that, because of too great a spacing between units, some workmen are supplied with only one-half or one-third as much light for their work as are others. Many office employees are forced to work under the same handicap. There are cases on record where the suspected incompetency of an employee with respect to his coworkers has been traced to the unsuspected cause of poor lighting.

Definite relations exist between the height at which units are mounted above the work and the distance by which they may be separated to provide reasonable uniformity in lighting.

and light from a sufficient number of directions so that shadows will not prove troublesome. These relations have been reduced to simple tabular form for the convenience of the designer of lighting systems. In general, the permissible distance between units should not be more than one and one-half times the height of the light sources above the work; closer spacings can do no harm and are often desirable but when this spacing distance is exceeded, the illumination between units falls off very rapidly. The user of light should consider very carefully before allowing his desire to keep initial costs low, lead him to install a system in which the proper spacing distance is materially exceeded.

Illumination of Vertical Surfaces

For many locations, such as offices and drafting rooms, light is required principally on horizontal planes, such as desk tops or table tops, and it has been the custom to calculate illumination on the basis of that delivered to horizontal surfaces with the assumption that the oblique surfaces of objects would be sufficiently lighted. This practice may result in inadequate illumination. In a machine shop, for example, the lighting of the vertical surfaces of the work or of the machine parts is fully as important as the lighting of the horizontal surfaces. As a matter of fact, most shops are lighted during the day by light from windows, which give a greater light on the vertical surfaces than on the horizontal. In all such cases where direct lighting is used, only those lighting units should be installed which show a reasonably good candle-power in the 50-70 degree zone as well as below these angles. A shop directed by closely spaced automobile headlights directing the light downward from the ceiling would furnish ample light on a horizontal plane but such lighting would be far from satisfactory.

Desirable Wall Brightness

The effectiveness of a lighting system depends not only on the effectiveness of the lighting unit, but also on the reflecting properties of the walls, ceiling and surroundings, and upon the size and proportions of the room. It is, in fact, entirely possible to find an installation of reflectors of poor design and inferior from the standpoint of glare, which is nevertheless, from the single standpoint of the percentage of light reaching the illumination plane, better than an installation where reflectors of good design are used, if the former are installed under favorable conditions such as light walls, ceiling, etc., and the latter under unfavorable conditions. On the other hand, it must be borne in mind that a large expanse of wall surface finished so light as to reflect a large volume onto the eyes is objectionable for offices, residence and all rooms where the occupants are likely to sit more or less directly facing the walls for considerable periods of time. Such data as are available indicate that where the brightness of the walls is equal to, or greater than, the brightness of the white paper lying on a table or desk, annoying glare will result. In fact, a wall brightness one-half of that of the paper has been found unsatisfactory—a brightness of one-fifth is, apparently, comfortable. With the usual types of lighting units, walls are not illuminated to intensities as high as those obtaining on desk or table tops, and walls which reflect less than 50 per cent of the light which strikes them should not produce discomfort, providing, of course, that they are of a mat, or semi-mat finish. Walls finished in buff, light green, or gray reflect about the proper proportion of light, and their use is meeting with general favor. Walls finished in a high gloss are not satisfactory from a glare standpoint.

Maintenance

The experiences with those who have installed high levels of illumination prove conclusively that every foot-candle delivered at the work has a definite tangible value.

The man who provides a system capable of delivering 10 foot-candles at the work and then allows the system to depreciate until it delivers only 3 or 4 is losing not only 60 or 70 per cent of the light he is paying for, but what is far more important, he is losing the profit on the difference between the output of his employees at this low level of illumination and their output at the higher level. If the depreciation of a lighting system were of the order of 2 or 3 per cent or even 10 per cent the matter would not be so serious a one, but surveys of installations in service show depreciations of 50 per cent, 60 per cent, and more. Many users are not getting

one-third of the light their systems are capable of delivering.

Illumination, Natural

The question of natural illumination has never received serious consideration, and even now, there are no available data other than that which has been developed in our organization. As we all know, or perhaps realize, after our attention is called to it, that all window shades are excluding instead of diffusing shades. A variety of colors are made, but always with idea of harmony in carrying out a color scheme. We depending on artificial illumination to perfect our color harmony. In industry we find everything from cotton sheeting to old rags used for shades as only about 5 per cent of all the industrial organizations have ever considered diffusing of the natural illumination with the idea of lowering maintenance cost for proper lighting.

We have within the past few months, induced one of the largest shade manufacturers to make for us a diffusing shade according to our ideas. These shades are so constructed that they meet our requirements in iudustrial and school work, yet are so made that they are washable, nonflammable, yet with use do not lose their diffusing powers. These shades are installed in several of our plants and schools, and the results are, that some of the larger retail stores are employing us to train their shade specialists so that they can go after and handle this diffusing shade business from a scientific standpoint.

Safety—Compensation Insurance

Compensation insurance is based on experience. The experience with accidents the previous year.

As a large part of the compensation insurance policies cover the employee whether in or out of industry, therefore, vision and illumination are important factors.

For the past several years much interest has been evidenced by progressive concerns in subject of safety. In fact, "Safety First" is one of the most common slogans.

This has been due chiefly to two factors; the desire of employers to assist in the welfare of their employees, through the prevention of accidents, and the other, the enactment of the Workmen's Compensation Laws. Those prompted by the former realize that accidents have a demoralizing effect on others besides the one injured, also that each injured operator means an idle machine or one partially so, until a new operator can be trained. In the second case, the employer is confronted by a financial as well as the human interest side, for, when an employee is injured, the company is subject to claim, which may reach a considerable proportion, also additional loss, due to the valuable training which the operator has had.

Magnitude of Safety Question

The following statistics obtained from clippings in the files of the Safety Institute of America are indicative of the magnitude of the accident question. If any of these accidents can be eliminated by the use of better illumination, or better vision, much good can be accomplished.

During the year 1913, there were 700,000 industrial accidents. Of this number 25,000 were fatal.

Every minute 21 persons are accidentally injured.

Every five minutes one person is accidentally killed.

Over 11,000,000 people are either injured or killed annually or about 30,000 every day.

More people are killed and injured yearly than have been killed or injured in any war of the last 200 years.

Five times as many persons are killed or injured each year as die from natural causes.

One death in every 12 is due to accidental causes.

Mr. F. E. Morris, Chief Secretary of the National Safety Council, Chicago, said that, during the 19 months the United States was in the war, 56,000 American soldiers were killed in action in Europe. During the same period, 226,000 men, women, and children were accidentaly killed in the United States.

The annual report of the National Highways Protective Society, for the year 1918, shows that in New York State, automobiles caused the death of 1189 persons. In New York City alone, during the same period, 748 persons lost their lives due to automobile accidents. Of the 441 cases of fatal accidents during 1918, 416 occurred from April 1st to December 31st, and only 25 from January 1 to March 31, undoubtedly because of the fact that

automobile traffic was practically suspended during that period, as the highways were blocked by the unprecedented fall of snow.

The annual report of this Society for the year 1919 shows that, of the accidents due to vehicular traffic in the State of New York, automobiles caused the death of 1270; 783 of these were in the City of New York, 487 outside of the city. During the year 1919, 227 persons were killed in the State of New Jersey, through automobile accidents.

Extracts from the report of the Committee on Public Accident Statistics show that,

The 1920 toll from all public and industrial accidents was equal in number to the total population of the State of Nevada.

The automobile fatality frequency for 1920 was thirty deaths a day.

During 1920, people died from falling accidents of all kinds at the rate of thirty-four a day.

Relation of Lighting to General Problem Industrial Plants

Without really serious thought on the question, one can readily see how mechanical guards over belts, saws and the like can prevent accidents by actually making it impossible for the workmen to come in physical contact with the danger sources. It is not so readily evident, however, that good lighting or vision do eliminate accidents.

Let us take several typical cases, and, by analyzing them, give an insight into the part lighting and vision plays in safe shop operation. Consider a plant lighted solely by drop lamps with shades to prevent direct glare; spots of brilliant illumination on the work; no general illumination of surrounding areas. A man has been working on the wood lathe—his eyes are accommodated to the high intensity at the work; he leaves the machine and hastens to get a new piece of material; he has possibly a chisel in his hand; he does not see the pile of lumber or the board that has been dropped on the floor near him and is in shadow or even darkness. He stumbles—falls—a serious cut results.

Stumbling or falling over obstructions is recognized by all insurance experts as one of the most frequent causes of industrial accidents. A reasonable intensity of general illumination is essential in every plant, and is particularly important in the steel mills and the like, where hot metal offers tremedous hazards. Do not attempt to light the shop with local lamps alone, if you wish to keep your accident rate low. In fact, modern practice provides a high intensity of illumination throughout from overhead units, with no local lamps, enabling the work to be carried on anywhere in the room.

Again, we have the case of an unshielded drop lamp hanging low over the machine. The workman glances at the bright filament—he is absolutely blinded for an instant. He reaches for the belt shifter; in his helpless condition, he grabs the belt instead and his hand is lacerated. The glaring lamp is the sole cause of this accident. As another example of the effect of improper lighting, it is well to quote from a paper presented by a representative of the Traveler's Insurance Company, before the Illuminating Engineers Society:

"A machine with four saws on one shaft was well guarded, but a drop light had been so arranged by the operator that one of the guards caused a shadow, and a man thought he was placing his hand on the guard, but instead he placed it on the shadow and was badly injured. This indicates improper lighting, and it points out the hazards of the practice of permitting the workmen to adjust the lighting units to his own convenience, instead of having them placed by a lighting expert, who has studied the safety problem carefully."

The same authority mentions the following instance:

"A workman was hurrying down a dim passage through a storeroom. Some steel bars were piled at one side; one of the pieces projected beyond the others; he did not see it, and with full force ran it into his eyeball, permanently losing the sight of the injured member."

One might go on for a considerable length and recite hypothetical and actual cases along this line (for example, an unshieled light at the head or turn of a stirway is a serious menace) but time precludes this, and the situation may be summarized somewhat as follows:

In a well lighted shop, obstructions being more readily visible are much more likely to be removed, or, even if not removed, are likely to be seen by

the workmen and, thus, accidents are avoided.

Similarly, over a wide range of conditions, good illumination and vision are the best possible warnings of danger, facilitating the removal of the cause, and further helping the employee to see any dangerous conditions and thus avoid danger. An employee is certainly entitled to this protection. Few employers would think of letting a blind man go in among powerful machines in a work shop, yet it often happens that they render an employee partially blind by glaring or inadequate illumination.

It is impossible so to guard a sharp cutting tool as absolutely to prevent an operator from reaching its danger point. If the tool is not clearly visible, injury is likely to occur, even though the best obtainable protective device is used.

A peculiarity of good lighting and vision is that they differ from many other safeguards, in that they assist rather than impede the workman, thus contributing toward raising the quality and quantity of the product. In other words, they pay from every point of view.

These facts apply not only to the interior of industrial plants but also to the yards surrounding them. In many of these yards there is a large supply of raw and finished material, and, unless these places are properly illuminated, accidents are likely to occur either by piles of material falling over, or workmen stumbling over piled material.

Vision, Industrial

After removing all of the contributing factors we come to vision itself. Here you may say, that we have the cart before the horse, but such is not the case, as we are now ready to show our efficiency through better vision.

In industry, we find, that forty percent, of all employees have defective vision, divided into three classes; ten per cent of which will be permanently relieved by the correction of the illumination; fifteen percent. will need the application of lenses for temporary wear, and fifteen per cent, that will need the application of lenses for permanent wear.

We find that fully one-half of these forty per cent have a loss of more than twenty per cent in vision, which means a loss in production of from four to ten per cent according to the type of labor. We further find that about ninety per cent of these defectives are willing to co-operate with us for the good of the organization, since our arrangement is entirely with the corporation and is not compulsory with the individual.

The result shown from time studies made in our work, tends to indicate that not all employees are properly placed in regard to their employment, but if properly placed, show a decided increase in production as well as to increase the morale of the employees.

Vision, School

School work differs materially from industrial work, in that, that we have an entirely different type of people to deal with, due to age, environment, and the character of the work. We find, however, that thirty-five per cent of all school children have defective vision, and these are divided into three divisions; ten per cent of which will be permanently relieved by the correction of the illumination; ten per cent that will need the application of lenses for temporary wear; and fifteen per cent will need the application of lenses for permanent wear.

We find that of all our first year students, on entering school seven per cent have defective vision, and at the end of the first year, if not properly cared for, fourteen per cent develop an eyestrain condition. We find that four per cent of all pupils entering school fail to pass their grade or pass on condition, and that one-half can be attributed to eyestrain, therefore the cost of left-overs is tremendously high for any school system.

Conclusions

Our conclusions in this work then, since we prove its value, are: First, That we have two distinct types of work, Schools and Industry. As school systems are, as is industry, run on a cost of work unit basis; That due to age, that the percentage of defectives is lower in school than in industrial work, but that the increase in efficiency is about on a par with that in industrial work regardless of the fact that the school students spend only a small part of their time in school work, and then mostly under natural illumination. Second, That the success of a work of this kind is dependent on the contributing factors. Third, That the sale of glasses merely removes one of the factors in this work. Fourth, That a work of this kind cannot be carried successfully when we are dependent on sales for our fees.

CAMPINETRY

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A great deal has already been written about the various methods of charting the visual field so I will endeavor as far as possible to confine this article to a brief description of one instrument, its usefulness and practical application to optometry.

It is quite essential that a field test be made on every patient who fails to read at least 20/40 vision with either eye using the best correction obtainable. The optometrist has a splendid opportunity to gain distinction in this line of work as many cases of Glaucoma, Brain Tumor, Heminanopsias and other disorders causing Scotomata, enlargement of the blind spot or contraction of the field, are quickly discovered by this test.

A patient may come to your office for glasses being entirely ignorant of the real cause for the existing discomfort. Perhaps the oldest known method for making a test of this kind was by the examiner employing one hand as a test object and using his eye as a standard gauge. This method in its crude way would often reveal a marked contraction of the field and Hemianopsia.

The perimeter was for many years a popular instrument among refractionists both medical and non-medical, but the results obtained were never satisfactory it being a monocular instrument, fixation was difficult, making it practically impossible to chart the blind spot or trace out small Scotomatas. For periferal work, the results were quite satisfactory and many refractionists still employ it for that purpose.

Field work was always more or less a mystery to the refractionist until Dr. Ralph I. Loyd worked out the large campimeter slate now regularly supplied with the campimeter. The actual field of the campimeter extends 10° nasaly, 40° temporally, 30° above, and 30° below the center of fixation. The campimeter possesses great advantages over the perimeter in that it allows both eyes of the patient to fix simultaneously. The campimeter slate is so designed that, when there is true binocular fixation, portions of the chart appear to stand out in relief. It is easy to keep the gaze fixed and the instant that fixation wavers, the stereoscopic value is lost. The instrument is so equipped that it is possible to correct any musclar imbalance that may be manifest at 190 m/m or the usual working distance of the slate. The patient's correction, if any, should be worn while making the examination. Six test objects are regularly supplied varying in size from ½ to 4°. Each test object consists of round two sided discs mounted at either end of a thin hard metal bar and in four colors, red, blue, green and white.

Assuming that the patinet, about to be examined, has vision O. U. 20/40 with correction and, with the aid of a 5° prism base out, Orthophoria is established at the working distance 190 m/m. We then ask the patient to fix on the central dot using the 1° test object we ask him to name the colors, red, green, blue and white. Again making sure that our patient is fixing, we slide the red disc directly out toward the temporal side until color is invisible. We now have patient's blind spot located and will trace in from all sides from visibility to invisibility making a chalk mark each time. We then connect dots by making solid line and have a complete outline of the patient's blind spot. Again starting at the center or point of fixation, we slide disc outward in all directions at 5° intervals until color becomes invisible. Repeat this with each of the four colors and connect dots until we have four solid lines. Should a Scotomata be present in either of the central or paracentral field, it will be quickly discovered and can be charted with the aid of the red disc. A case of Hemianopsia would be traced out in the same manner. An enlarged blind spot may indicate he existence of Glaucoma in an incipient stage, this enlargement increasing as the disease progresses until the resulting Scotomata extends to or includes the point of fixation. Cases of Brain Tumor, detachment of the retina, and many other pathological conditions will manifest themselves as a Scotomata in the visual field.

NOTES, CASES AND INSTRUMENTS

OPTOMETRIC ORDER OF STUDY

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For several years it has been my idea that there should be a radical revision of the so-called "subjects" of Optometry. In reality there is no such thing as "theoretic" optics, or "theoretic" optometry. They are all Optometry, the "theory" is fact, not suppostion, nor superstition. I would propose dropping the word bodily "down the well." Moreover there is no possibility of there being an actual study of either of the above things. A book on such a subject is an absurdity. No one could write such a thing. No one could study such a thing even if written, for either and both run right off into that even more absurd title of "practical" optics, and "practical" optometry.

Is there such a thing as practical dentistry, theoretic law, practical chemistry, theoratic chemistry, practical and theoratic surgery? Neither of Optometry. Let us not seek to replace the terms with others, but to revise the subject of Optometry to make vertical divisions, rather than such stratifications, separating it into the several components which go to make up an rounded-out optometrist.

My idea is to make a study of Light, its origin, propagation, measurement, illumination powers, colors, efficiency, its absorption by various surfaces and bodies, the theories of color, wave lengths, transparent and solid substances which have "color", and the absorbing characteristics of such substances.

Next is the manipulation of light, the study of wave-power and dispersion of wave values by virtue of distance of travel, as Reese outlines in his work. Here comes in refractibility and refrangibility, deflection of the wave, or of the direction of wave. This leads up logically to the effectivity of curved surfaces up the impinging wave, the emergence of waves from such surfaces. The various curvatures are considered in connection with the curve of impinging and emerging wave front. Next follows the influence of density of the substance of which this curved body is now conceived to be the boundary as a lens-like formation. Follow this with the activity of plano and of curvilinear, reflecting surfaces. There isn't any "theerey" in any of this—the thing is taking place everywhere, and all the time.

Physiological structures which are like the foregoing problems here follow in proper sequence, the activity of cornea, lens, its differing densities, the liquids, their indices, the new submerged index of lens in liquids, the problems of achromatism of these lens-structures. Many points here to be worked out.

Problems of refraction follow in their proper connection, for they are now akin to those which have preceded. The problems of skiamery, of the optometer, of subjectivicism all have a direct connection at this point, and there is no theory but what has been brought along in practical, and applied form.

There isn't any such thing as practical and as theoretical anatomy, practical or theoretical physiology, nor of pathology, nor of pathology, is there? These are "constants" there is a variant, the facts simply exist, and as such are recognisable at face value.

Take up the subject, in connection with the problems of the keratometer (optometer) and make them real problems in reflection, and as real ones in refraction. This will induce a respect for the instrument which is now wanting. The subject of Skiametery can be made one which is unique and distinct in and of itself, for not only have many of the problems been brought to the front before, but herein they can be enlarged upon with a meaning of their own.

There is certainly nothing "radical" in thus readjusting the topics entering into the science of Optometry, but rather it is a perfectly logical order of study, and perfectly logical to so present the questions. It seems as though this manner of approach by examining bodies would be far easier to the candidate, and that it would have an influence upon the manner of presentation of the curriculum. Moreover this would also enable the student body to make better use of text books upon light than they now find possible, because the problems are approached as such, with their direct application to those of the eye itself.

SIX FOOT WORKING DISTANCE IN STATIC RETINOSCOPY

Walter B. Lyon, Opt. D.

Albert Lea, Minnesota

The following procedure, as applied to the technic of static retinoscopy, the writer believes to be of merit, inasmuch as many of the inaccuracies of this phase of an ocular refraction are due to the inaccuracy of the refractionists working distance.

Instead of sitting close up to your patients in static retinoscopy and having them gaze through a series of mirrors, as worked out by Dr. Sheard, this method is to sit from six to eight feet in front of the patient, directing their vision just over the top of your head, having them look off into the distance. The room is somewhat illuminated in a soft light, the operator using an illuminated retinoscope. You will find that after a few trials of this method that the shadow will be very plain with a minimum of scissors movement as well as a minimum aberration. In errors, small or large, it is possible in many cases to refract within a twelfth of a diopter.

In using the six foot working distance, it is necessary of course to deduct one-half diopter from your reversal findings, while in using an eight foot distance a deduction of one-fourth diopter usually seems sufficient.

Many do object to using the retinoscope at this distance as it means a great deal of getting up and down, and going back and forth, in the matter of placing lenses in the trial frame and in taking static reading, but its simplicity and accuracy makes it well worth while. An assistant could be asked to place the lenses in frame which would no doubt eliminate this objection.

ASTIGMATIC-ANISOMETROPIA

L. L. DeMars, Opt. D., F. A. A. O.,

Minneapolis, Minn.

Patient a university student 19 years of age, came to my office complaining of constant headaches, frontal and occipital, coming on when he does any continued close work. His visual acuity with both eyes was 15/20 plus. The visual acuity of left was 15/30 plus. The visual acuity of the right eye when he squinted was 15/20, but 15/40 when not. Opthalmoscopic examination gave negative results. Pupils contracted regularly. Opthalmometric findings gave O. D. 1.75 D. axis 90; O. S. 2.00 D. axis 180; Static retinscopy gave minus 0.25 D. Sph. () minus 1.25 D. cyl. axis 180 for right eye and for the left a minus 0.25 D. Sph. () plus 1.25 D. cyl. axis 105; Dynamic retinscopy checked with the static. Vision with these lenses proved to be normal with each eye separately and with both eyes together though the letters with O. D. were blacker and more clear cut than with O. S. These results were finally checked by the regular fogging test but it was found that by substituting a minus 1.25 D. cyl. axis 180 before O. D. that vision was only slightly less than normal. These were the lenses which were finally prescribed. Duction tests were near normal, while phoria tests showed 4 prism diopters of Exophoria at distance and 8 at near. After prescribing as above described it would not have been surprising to the writer to have had the patient return with more or less complaint about discomfort. Fortunately the correction so established amicable relations between accommodation and convergence that the glasses were accepted with pleasure right from the start. Two things at least strike the observer of the above case as rather odd, first the slight dissimilarity in the visual acuity of the two eyes for the wide difference in the ametropia and the similarity of the amount of the two corrections bearing the signs and axis.

The close similarity in the visual acuteness of the two eyes was due to the fact that the refraction of each eye in the horizontal meridian was nearly emmetropic and that by squinting or narrowing the palpebral fissure the ametropia of the vertical meridians was cut off and very clear vision obtained. The effect of the correction while it did not have to increase the visual acuity to a great extent, did however relieve the strain on the palpebral muscles, as well as the ciliaries in the left eye and gave greater harmony to the co-ordinate functions of accommodation and convergence.

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PROFESSIONALISM VERSUS COMMERCIALISM

One of the large problems confronting the embryo optometrist just entering practice, as well as the present day practitioner, is, shall I professionalize in an upstairs office or shall I commercialize my practice by establishing myself in a location fitted chiefly for the sale of merchandise. One gleans an insight as to the trend, the future optometrists and those now in practice are drifting towards, by a close contact with fellow optometrists at our national gatherings. It is true, some of our very good optometrists are still located in very commercial surroundings, but public opinion will demand that the future practice of optometry, to gain the recognition we are striving for, be located in exclusive separate offices. The high rents being charged in our larger centers, are optometry's best friend in this regard, as it is forcing the better practitioners to eliminate this burdensome overhead and practice their profession as it should be practiced in upstairs offices.

An upstairs practice enables the optometrist (when properly trained) to place his services on a par with any refractionist, and it has been the experience of those engaged in an optometric office practice, that this office practice gives added prestige, encourages better work and permits better fees.

Oculo-Prism treatment work, the proper handling of Anisometropes, the vision stimulating exercises for the Amblyope, the development of the Accommodative Powers, etc., are the big fields the more scientific optometrists are working into. These cases can best be handled in an upstairs office, where appointments can be made in advance—some of our optometrists are booked months in advance on this work.

In the near future, the present day practitioner will have to raise his practicing standards to keep abreast of the four-year graduates that our leading universities are turning out, who are sure to establish themselves in professionally equipped offices.

To care for the responsibility and further establish the confidence the public has in our profession, rests with the optometrists who have the foresight and ability to elevate optometry on a plane with other kindred professions.

G. C. J.

A NEW TEST CHART

In taking the Acuity of Vision or the power of the normal eye to see clearly, three factors are involved. The first is the sensitivity of the retina to light. The second, is the power to form clear images on the retina, and the third, is the power to discriminate detail in the physical image formed.

Dr. E. G. Wiseman, optometrist and author of note, has recently perfected a test chart, which in the opinion of the writer is a distinct step forward. The chart is divided into three principal portions. The broken arc in various positions and sizes occupies the top of the card. The astigmatic fan, the central portion, and the test letters, the lower portion. It is in this lower portion, particularly that a distinct advance in optometric science has been made. As has been known for years, some letters are more easily read than others at any given distance. Dr. Wiseman has taken this into consideration and the letters in the different groups on his card, are of various sizes, all calculated to produce the same degree of effort upon the resolving power of the refractive media. Thus a letter like "O," which is easy to read, is quite a bit smaller, than for instance, a "B," which is much more difficult to discern. Dr. Wiseman has been working on this problem of relative letter size for years, and after much study and a great deal of experimental work has brought forth his present chart. Another advance over the charts in general use today, is that the letters appearing on the chart are staggered. That is, the letters are placed in groups rather than in rows, thus making it quite necessary for the patient to concentrate on the work at hand, and to a great extent eliminating any chance for later memory reading.

Dr. Wiseman's new test chart is one of the fruits of hard labor and study, and it fully satisfies the need for a test chart, with regards to the patient's ability to form clear images on the retina and his power to discriminate detail in the physical images formed. We now need some simple test that will enable us to take the sensitivity of the retina to light. Our work along this line will not be on a real scientific basis until it is possible to combine all of these three elements.

Wiseman is again blazing the trail, and optometry owes a great debt to men of his caliber who make great personal sacrifices so that our profession may go ever forward.

C. C. K.

OUR SOCIETIES

An optometric society is more of an institution than most optometrists seem to think. Many members do not stop to figure out that it must be "run" just the same as any professional practice must be run, only more so. An optometric practice stops and starts, but a society runs on forever. No matter how good business may be —no matter how poor it is, the old society is supposed to keep right on functioning in its usual manner.

The only way an optometric society can function is for some one to make it do so. It simply will not run itself. Some one must be in charge of the work. Whenever some eloquent individual puts up an argument that is strong enough to overcome one's natural inclination to back away from things more or less impersonal, such as a society, and one finds himself in posession of a society job, prepare to meet the wrath of the fellow who has never done anything for the society, never wanted to and never will. About the first time the opportunity presents itself he will show up and tell you what he thinks of the work that is being done. He appears only with a complaint. He never registers a word of commendation. He packs a disagreeable wallop. He makes one wonder why he accepted the job.

Society officers experience some of the thrills of present day politicians. They never realize how many things are wrong with their regime until they get mixed up in a full sized job of helping to run the society. Yet it is to the credit of all optometric organizations, that there are public spirited optometrists who are willing to stand up and take these jobs. If it were not for these men there would be no societies, and without these societies it would be difficult for us to keep on practicing from year to year and for us to keep on improving our refractive technic.

C. C. K.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

NORTH DAKOTA OPTOMETRIC ASSOCIATION CONVENTION

August 12-13, Fargo, N. D.

"On to Fargo"

The activities of the convention will be mostly clinical in nature. The clinicians will be Dr. Thomas Porte of Bemidji and Dr. H. Kornmesser of Jamestown, N. D. A model refracting room equipped with one of the modern refracting units, stero-campimeter, sterilizer, etc., will be used in examining the patients furnished. The patients will receive a thorough routine examination and the clinician in charge will explain each step as he passes along and answer any question that may be asked.

At the evening session of August 12th, Dr. Geo. McIntyre of Minneapolis will deliver a stereopticon lecture on Ocular Pathology which should prove of interest to every one who attends. We also expect to have some actual pathological cases which will be demonstrated. Dr. McIntyre will also deliver a lecture on "External Influences of the Eye" at the morning session of August 13th.

It is the wish of the officers of the North Dakota Optometric Association that there will be a large attendance, even larger than last year. All optometrists whether they are members of the North Dakota Optometric Association or not are invited and urged to attend; to see some modern ophthalmic equipment and some interesting cases refracted with the opportunity of asking questions and seeing how an expert refraction is performed.

According to present plans the banquet will be held on the evening of the 12th.

Don't forget the dates, August 12th and 13th, Fargo, N. D., North Dakota Optometric Association Convention.

THE NEBRASKA METHOD OF SCHOOL PENETRATION

A Message to the Members of the Nebraska Optometric Association

Some time this month, the secretary will mail out to all members of the state association **in good standing,** cards for their signature, which he will countersign and which will then be forwarded to the county superintendents, offering services as designated, official examiners of schools, for a period of ninety days from date of notice.

This was done last year and in many instances, died there. However, some of the men carried the matter further, with varying success. Skeffington of Kearney devised a method that worked to splendid success and which will be the official method of this year.

A photograph was taken of the countersigned card and reproductions printed on post cards. These were enclosed in a letter to the county school boards, telling them of the need of school examinations, of the improvement possible and of the co-operation that could be had simply by asking for it.

A very large number of schools requested an examination and dates were set and the calls made at the country schools. The examinations were made with retinoscope, candle and Maddox and visual acuity determinations. The results noted and after returning to the office, the individual parents notified, a list and recommendations sent to teacher, school board, county superintendent and county nurse.

Optometry must get into the schools. We must carry our message to the children. We dare not and must not wait for them to grow up. They will grow up in the wrong camp. Now is the time to bring the message of

optometry to the parents and guardians of children and to the children themselves.

See to it that you are already to mail this matter out by the time school opens. A delay costs you prestige—and other things. This is available only to members of the state association in **good,** paid-up standing, for 1924-5! No one thing we know will do more to build optometry and build optometrical practices this year than just this one item, and it is only one of many that will be extended members of the state association.

Any member who wishes more detailed directions, may have them by applying to Dr. Garland of Beatrice or Skeffington of Kearney. We want to build our association strong this year and get in as many paid-up memberships as early as possible to be enabled to avail ourselves of the national plan of aid in financing our state clinics. Letters, inserts, cards, etc., will be furnished.

Incidentally, any town that wants one of the clinics held there this year will do well to communicate early with Dr. Garland and make arrangements, as some have already spoken and the number will be limited. If you are curious as to the advantage to you and your work, write Dr. Blaine of Norfolk or Perrigo of Fremont.

THE NEBRASKA CONVENTION

The annual convention of the Nebraska Optometric Association was held this year at Kansas City, during the national congress. The former president and secretary, Dr. Dunlap and Dr. Dixon, refused to consider renomination and so a wholly new administration was elected. Dr. J. M. Perrigo of Fremont was elected president, Dr. L. C. Hewitt of Neligh, first vice-president; Dr. B. G. Bauman of Alliance, second vice-president, and Dr. R. E. Garland of Beatrice was elected secretary-treasurer.

Dr. A. M. Skeffington of Kearney and L. M. Jones of Fairfield were recommended to the governor for appointment to the state board.

The following resolutions were presented by Dr. Skeffington, who as chairman of the clinical committee presented the resolutions and moved their adoption:

Resolved, First, That the Nebraska Optometric Association refuse the affiliation fees of any optometrist using unethical advertising, in which price, merchandising or the extolling of personal qualifications are used.

Second, That the Nebraska Optometric Association create a committee on state clinics, with instruction to hold at least five post-graduate clinics in the state during the coming year and that they be empowered to draw on the state association for funds to this end.

Third, That the national post-graduate clinic plan be endorsed to the A. O. A.

Fourth, That the Kiekenapp plan of financing clinics be endorsed.

Fifth, That the Nebraska Optometric Association adopt the Northwest Journal of Optometry as its official organ.

(By means of this program the Nebraska Optometric Association hopes to thrust Nebraska forward into the ranks of the forward looking states. It is the hope of the officers that optometrists in the state will be encouraged to take up exclusive, professional optometry and that good, clean cut, modern men will consider Nebraska a worthy state in which to found practices. Editor, Northwest Journal of Optometry.)

In Memoriam

JOHN J. PALMER, Opt. D.

It is with very great regret that we record the death of Dr. John J. Palmer, who for the past fifteen years practiced as an optometrist in the City of Duluth. Dr. Palmer, who was a member of the Trinity Masonic Lodge and of the Head of the Lakes Society of Optometrists, will be greatly missed by a large circle of friends. Dr. Palmer was nearing his 54th birthday at the time of his death.

MINNESOTA STATE ASSOCIATION BULLETIN

By J. I. Kurtz, Secretary

The national secretary informed this office of the adoption at the A. O. A. convention of the "National Aid Plan for Optometric Clinics."

This plan works out as follows: The state association may conduct a regular clinic, where the members will have a chance to see an experienced clinician examine cases in a model refraction room and at the same time explain step by step the workings and technic of the examination and the findings. The national association will pay to the state association $1.00 for each paid up member. That is if a state has paid up affiliation dues for 200 members it will be entitled to $200 financial aid from the national association, providing the state spends a like amount. Minnesota should be one of the first states to put up a clinic of this type. We must have our affiliation dues all paid up in order to get a fair share of this financial aid. Members who have not paid their dues for 1924 are urged to take care of this matter **now.**

Spectacle Peddlers

Reports have reached the secretary's office that some subscription solicitors for Cappers Weekly are traveling through the state peddling spectacles while soliciting subscriptions. By so doing they are violating Chapter 127 of the Laws of Minnesota for 1915—makes it a serious offense "for glasses to be vended as merchandise, except from permanently located and established places of business." This will apply to the sale of glasses from booths at street, county and state fairs as well as peddling on the street or from house to house.

These men should be made to abide and respect the laws of this state. Cut out the quotation of the Optometry Law in this article and show it to your town constable, marshal or sheriff and they will co-operate with you in clearing out your territory. Let eternal vigilance be the watchward. Appoint yourself as a member of the vigilance committee in your district and act.

Spectacle Peddlers at State and County Fairs

The spectacle peddlers usually find their way to the state and county fairs. If you will get in touch with the chairman of your county fair and inform him that by renting a booth to a spectacle peddler he is a party in helping violate the state law, you may rest assured that no booths will be rented to any of these cronic law breakers. Let us all work together and help clean up the state. Don't wait for George to do it. Let us do it ourselves.

NEBRASKA MEN ON STAFF

Starting with the August issue of the Northwest Journal of Optometry this publication becomes the official organ of the Nebraska Optometric Association, as well as the Minnesota and North and South Dakota societies. This action was taken in Kansas City at the yearly meeting of the Nebraska men, when they decided to accept the

A. M. SKEFFINGTON, Opt. D.

offer of the Minnesota society and join with them in the use of The Journal.

Dr. A. M. Skeffington, of Kearney, Nebraska, has, at the request of the editor, been appointed to the Editorial Staff of the magazine and the following men from the same state have been requested to serve as collaborators: Dr. C. A. Perrigo, Fremont; Dr. B. G. Bauman, Alliance; Dr. E. E. Simmons, Norfolk; Dr. Chas. Dickson, North Platte, and Dr. C. J. Vlack, Omaha.

CURRENT LITERATURE

These are the titles of papers bearing on optometry. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the Authors name in **heavy face type.** The abbreviations mean: (Ill.), illustrated; (Pl.), plates; (Abst.), indicates that it is an abstract of the original article; and (Dis.), that discussion is published with paper.

COLOR VISION

Neifeld, M. R. The Color Sensation Theory of Dr. Schanz. Amer. Jour. of Phy. Opt. Vo. 5, No. 2, pp. 242-249.

Venable, W. M. Color and Luminosity. (Ill) Amer. Jour. of Phy. Opt. Vol. 5, No. 2, pp. 170-204.

INDUSTRIAL EYE WORK

Schriftgiesser, R. Pulling out the Motes in the Motorists Eyes. The Conn. Optom. Vol. 1, No. 3, pp 8-10.

Standards of Vision for Scholars and Teachers. (Abst) E. E. N. & T. Mo. Vol. 3, No. 5, pp. 283.

OPTOMETRY

Capel, A. O. Thomas Young, His Life and Work. The Ref. (Brit) Vol. 13, No. 152, pp. 90-93.

Kurtz, J. I. An Optometric Educational Program for the Layman. N. W. Jour. of Optom. Vol. 1, No. 6, pp. 118-119.

Strother, Mr. A Code of Ethics for the Optometrical Profession. The Ref. (Brit) Vol. 13, No. 152, pp. 94-95.

Swaine, W. Ophthalmo-Optical Etymology. The Optican, (Brit) Vol. LXVII, No. 1730, pp. 219-220.

Todd, W. S. The Problems of Reciprocity. Opt. Jour. and Rev. Vol. LIII, No. 22, pp. 37-38.

English Translation of Von Helmholtz. (Editorial) Amer. Jour. of Phy. Opt. Vol. 5, No. 2, p. 205.

Optometric Code of Ethics. (Special Report) N. W. Jour. of Optom. Vol. 1, No. 6, pp. 121-122.

PRACTICAL OPTOMETRY

Aronsfeld, G. H. Some Bifocal Considerations. (Ill) Opt. Age. Vol. 21, No. 2, pp. 35-36.

Bock, F. W. A Bifocal Device. E. E. N. & T. Mo. Vol. 3, No. 5, p. 270.

Hardy, W. E. Pliering and Adjusting The Optican. (Brit) Vol. LXVII, No. 1730, pp. 228-229.

Prescribing and Making of Lenses. (Editorial) E. E. N. & T. Mo. Vol. 3, No. 5, p. 272.

PHYSIOLOGICAL OPTICS

Fjelstad, E. O. The Optic System of the Eyes. (Ill) No. W. Jour. of Optom. Vol. 1, No. 6, pp. 102-107.

George, E. J., Torren, J. A. and Lowell, J. W. Study of the Ocular Movements in the Horizontal Plane. (Abst) N. W. Jour. of Optom. Vol. 1, No. 6, pp. 111-112.

Landolt, E. The Angle Alpha. (Abst Amer. Jour. of Phy. Opt. Vol. 5, No. 2, pp. 259-266.

McFadden, F. Accommodation, (Ill) Opt. Age. Vol. 21, No. 2, pp. 55-58.

Sheard, C. The Physiological Effects of Radiant Energy, especially upon the Human Eye. (Ill) Amer. Jour. of Opt. Vol. 5, No. 2, pp. 214-141.

Troland, L. T. The Optics of the Nervous System. Amer. Jour. of Phy. Opt. Vol. 5, No. 2, pp. 127-153.

Whitwell, A. Steroscopy and Anaglyshs. (Ill) The Optican. (Brit) Vol. LXVII, No. 1729, pp. 207-212.

Zoethout, W. D. Weber's Law, (Ill) The Optom. Wky. Vol. 15, No. 12, pp. 495-496.

OCULAR PATHOLOGY

Fuchs, A. Changes of the Disc in Cases of Gloucoma. (Pl) (Ill) Amer. Jour. of Oph. Series 3, Vol. 7, No. 6, pp. 425-436.

Jones, A. Scotomata and Meters, (Ill) The Optician. (Brit) Vol. LXVII, No. 1729, pp. 201-206.

Mitchell, A. S. Glaucoma-Simplex from an Optometric Standpoint. Opt. Jour. and Rev. Vol. LIII, No. 21, p. 28.

Rogenbaum, M. Ophthalmoplegia Interna. Opt. Jour. and Rev. Vol. LIII. No. 20, p. 33.

Scherer, C. M. Scherer's Cataract Lenses and Spectacles. (Ill) Opt. Age. Vol. 21, No. 2, pp. 19-23.

White, D. W. & P. C. The Medical and Surgical Treatment of Trachoma. (Ill) E. E. N. & T. Mo. Vol. 3, No. 5, pp. 255-261.

GENERAL REFRACTION

Bind, E. The Routine Examination. The Can. Optom. Vol. 6, No. 5, pp. 135-137.

Churchill, B. J. Obstructed Indirect Vision. (Ill) Opt. Age. Vol. 21, No. 2, pp. 31-33.

Decker, J. C. Cycloplegics in Refraction, Permanent Loss of Accommodation Following the Use of Homatropin. Amer. Jour. of Oph. Series 3, Vol. 7, No. 6, pp. 443-445.

DeMars, L. L. Sub-Normal Accommodation. N. W. Jour. of Optom. Vol. 1, No. 6, pp. 108-109.

Freidenwald, H. Change in Refraction. Amer. Jour. of Oph. Series 3, Vol. 7, No. 6, pp. 457-458.

Ingham, S. D. and Lyster, T. C. Abnormalities of the Visual Field. (Abst) N. W. Jour. of Opt. Vol. 1, No. 6, pp. 110-111.

Koch, C. C. Unusual Improvement Shown in the Acuity of an Anisometrope. N. W. Jour. of Optom. Vol. 1, No. 6, pp. 109-110.

Lee, G. T. The Value of Prisms in Making a Retinoscopic Examination. Opt. Age. Vol. 21, No. 2, pp. 33-34.

(Continued on Page 166)

Lunt, L. K. and Riggs, A. F. Neurotic Disturbances of Eye Function. (Abst) N. W. Jour. of Optom. Vol. 1, No. 6, p. 111.

Maybee, W. G. Anisometropia and Antimetropia. The Can. Optom. Vol. 6, No. 5, pp. 142-143.

Roman, H. Blue Lenses in Cataract Cases. Opt. Jour. and Rev. Vol. LIII, No. 23, pp. 31-32.

Skeffington, A. M. Consideration of the Asthenope, Amblyope and Presbyope. Opt. Age. Vol. 21, No. 2, pp. 25-29.

White, J. E. Physiological Component of a Ciliary Cramp. (Abst) N. W. Jour. of Optom. Vol. 1, No. 6, pp. 110.

OCULAR MUSCLES

Banister, J. M. Functional Anomalies of the Ocular Muscles. (Ill) Amer. Jour. of Phy. Opt. Vol. 5, No. 2, pp. 154-169.

Bind, E. Heterophoria and Its Treatment. Amer. Jour. of Phy. Opt. Vol. 5, No. 2, pp. 250-258.

Lyon, W. B. Temporary Paralysis of the External Rectus Muscle. N. W. Jour. of Optom. Vol. 1, No. 6, p. 108.

Peckham, R. M. Selection of Cases for Muscular Exercises. Opt. Jour. and Rev. Vol. LIII, No. 21, pp. 25-27.

Sheard, C. Quality as Well as Quantity in the Functions of Accommodation and Binocular Single Vision. (Abst) N. W. Jour. of Optom. Vol. 1, No. 6, p. 112.

The Maddox Double Prism. (Editorial) Amer. Jour. of Phy. Opt. Vol. 5, No. 2, pp. 206-209.

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